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Comparing temporally-focused GPC and CGH for two-photon excitation and optogenetics in turbid media

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Inherent inhomogeneity in turbid media not only hinders imaging but also projection of arbitrary light patterns for excitation or optical manipulation. In this work we compare two of the most popular phase modulation-based techniques in beam shaping. The Generalized Phase Contrast (GPC) method uses a 4f setup that directly converts phase information to intensity. The GPC method has been used with temporal focusing for excitation in two-photon optogenetics [1-3]. The computer generated hologram (CGH) is also used to generate arbitrary light patterns and has been used for optical manipulation and fabrication because of its high diffraction efficiency and axial confinement.

We model the effect of the turbid media as a phase randomization process. We compare the quality and asses the degradation of the projected light pattern for both techniques as it propagates in the turbid media.

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